

An insulating film deposition chamber 40 has a plasma generator 14 having a plasma generation chamber 21 separated from the film deposition chamber 13 in which the substrate is arranged. A material gas is directly supplied to the film deposition chamber, and radicals are introduced into the film deposition chamber from the plasma generator, and a thin film is deposited on the substrate. Further, a cleaning gas feeder is added to the plasma generator. A cleaning gas is introduced through the cleaning gas feeder to produce plasma at the plasma generator to generate radicals, and the radicals are introduced into the film deposition chamber and irradiate the substrate to clean it.